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U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY DOCKET NO.
09/926,373	Philippe Furodet	024118-00011

INTERNATIONAL APPLICATION NO.

PCT/FR00/00995

LA FILING DATE

PRIORITY DATE

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Robert B Murray
 Arent Fox Kintner Plotkin & Kahn
 1050 Connecticut Avenue NW
 Suite 400
 Washington, DC 20036-5339

CONFIRMATION NO. 9237

371 FORMALITIES LETTER



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Date Mailed: 11/19/2001

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as an Elected Office (37 CFR 1.495):

- U.S. Basic National Fees
- Priority Document
- Copy of IPE Report
- Copy of references cited in ISR
- Copy of the International Application
- Copy of the International Search Report
- Information Disclosure Statements
- Request for Immediate Examination

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Translation of the application into English.
- Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the International application number and international filing date.

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTH FROM THE DATE OF THIS NOTICE OR BY 22 or 32 MONTHS (where 37 CFR 1.495 applies) FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

*A copy of this notice **MUST** be returned with the response.*

WINSTON M ALVARADO

Telephone: (703) 305-6421

PART 2 - OFFICE COPY

U S APPLICATION NUMBER NO	INTERNATIONAL APPLICATION NO.	ATTY DOCKET NO.
09/926,373	PCT/FR00/00995	024118-00011

09/926,373 PCT/FR00/00995 024118-00011

FORM PTO-1390
(REV 5-93)U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICEATTORNEY DOCKET NO.
024118-00011TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

DATE: October 22, 2001

U.S. APPLN. NO.
(IF KNOWN, SEE 37 C.F.R. 1.5)
Not Yet Assigned

09/926373

INTERNATIONAL APPLICATION NO.
PCVT/FR00/00995INTERNATIONAL FILING DATE
14 April 2000PRIORITY DATE CLAIMED
21 April 1999TITLE OF INVENTION: DIE-STAMPING METHOD AND TOOLS, USE THEREOF FOR STAMPING BENCHES AND STAMPED ARTICLES
SUCH AS BENCHES THUS OBTAINED

APPLICANT(S) FOR DO/EO/US: Philippe FURODET

- ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
(THE BASIC FILING FEE IS ATTACHED)
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
- ☒ This express request to begin national examination procedures [35 U.S.C. 371(f)] at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
- ☐ A proper demand for International Preliminary Amendment was made by the 19th month from the earliest claimed priority date.
- ☒ A copy of the International Application as filed [35 U.S.C. 371(c)(2)]
- a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
- b. ☐ has been transmitted by the International Bureau.
- c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
- ☐ A translation of the International Application into English [35 U.S.C. 371(c)(2)].
- ☒ Amendments to the claims of the International Application under PCT Article 19 [35 U.S.C. 371(c)(3)]
- a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
- b. ☐ have been transmitted by the International Bureau.
- c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
- d. ☒ have not been made and will not be made.
- ☐ A translation of the amendments to the claims under PCT Article 19 [35 U.S.C. 371(c)(3)].
9. ☐ An oath or declaration of the inventor(s) [35 U.S.C. 371(c)(4)].
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 [35 U.S.C. 371(c)(5)].
- Items 11 - 16 below concern other document(s) or information included:
11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.
13. ☐ A **FIRST** preliminary amendment.
- ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information: ☒ PCT/RO/101 (in French); PCT/ISA/210 (in French); PCT/IPEA/408 Written Opinion (in French); PCT/IPEA/409 International Preliminary Examination Report (in French); Front Page of International Application as published WO 00/64607
Drawings (9 sheets)

13 Rec'd PCT/PTO 16 JAN 2002

09/926373

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Philippe FURUDET

Group Art Unit: Unknown

Application No.: 09/926,373

Examiner: Unknown

Filed: October 22, 2001

Attorney Dkt. No.: 024118-00011

For: DIE-STAMPING METHOD AND TOOLS, USE THEREOF FOR STAMPING
BENCHES AND STAMPED ARTICLES SUCH AS BENCHES THUS OBTAINED

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

January 16, 2002

Sir:

Prior to initial examination of the application, please amend the above-identified application as follows:

IN THE CLAIMS:

Please amend claims 3-5, 7-16, 18, 19, 21-27 and 29-31 as follows:

3. (Amended) The stamping process as specified in claim 1, wherein the front blank holder (AV) 30 is also widened (toward the front).
4. (Amended) The stamping process as specified in claim 1, wherein the geometric adaptation of the blank holder AR represents one-half the form created by the punching die 4 in its AV part.
5. (Amended) The stamping process as specified in claim 1 adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight seats or

more, requiring several consecutive seat forms or imprints 11, 12 separated by interval i, wherein use is made of a tool the AR blank holder 100 of which reproduces (in its part B) at least one part, preferably precisely on-half (A) of the seat from 11, 12 created by the punching die 120 in its AV part, or creates more than one-half, up to the totality, of the form created by the punching die.

7. (Amended) The stamping process as specified in claim 5, adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight or more seats, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval i, wherein the blank holder has been widened toward the front.

8. (Amended) The stamping process as specified in claim 5, adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight or more seats, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval i, wherein the profile 8 of the blank holder AV 110 remains horizontal.

9. (Amended) The stamping process as specified in claim 5, wherein the blank holder 110 may have a slightly convex surface or profile favoring transition in deformation from the metal sheet to the punching die.

10. (Amended) The stamping process as specified in claim 1, wherein the metal sheet T is positioned so as to produce a first stamping form or "initial stamping," then the metal sheet which has undergone this initial stamping is then displaced toward the rear and the initial stamping is brought to rest in area 130 AV of the blank holder AV of the blank holder AR 100, after which the second stamping is carried out and so forth until 2, 3, 4, 5, 6, 7, or 8 imprints or more have been produced.

11. (Amended) The stamping process as specified in claim 1, wherein the blank holder AR 100 reproduces in its part B one-half of the seat imprint, which is identical to half-form A of part AV of the punching die 120, the arrow indicating the direction of step-step movement of the metal sheet to permit production of consecutive imprints.

12. (Amended) The stamping process as specified in claim 1, wherein the tool comprises, between the blank holder AR 100 and the punching die 120, a shoulder 150 which reproduces the interval i which must be present between two consecutive seat imprints.

13. (Amended) The stamping process as specified in claim 1, wherein a pressure of the order of 150 to 300 or 350 to is applied for a metal sheet 15/10 mm or of 12/10 mm or of 10/10, 8/10, or 6/10 mm.

14. (Amended) The stamping process as specified in claim 1, wherein this shoulder 150 forming interval i is reduced to values of the order of 1 to 3 or 5 cm for 15/10 mm metal sheets, or even one measuring 10/10 or 8/10 or 6/10 mm, or even preferably to a value $i = 0$, without marking and without folds or curls.

15. (Amended) The stamping process as specified in claim 1, wherein at least one part of base part B of blank holder AR 100 is replaced with other support means, such as friction rollers, etc.

16. (Amended) The stamping process as specified in claim 1, wherein the stamping process comprises a metal sheet performing step, preferably performing by means of a folding machine.

18. (Amended) The stamping process as specified in claim 1, wherein the metal sheet T is positioned without concern for vertical alignment with the punching die 4 and

the punching die 10, it being possible for the metal sheet to be offset, for example, by distance m relative to the vertical alignment, and wherein the press is then lowered slowly and the metal sheet is allowed to center itself on the tool.

19. (Amended) A tool for application of the stamping as specified in claim 1, characterized in that such tool comprises a bottom die 10 and a punching die 4 clamped by front (AV) and rear (AR) blank holders, and in that the blank holder AR 20 is widened toward the rear in comparison to the dimensions of the prior art and has on the end adjacent to the punching die 4 (that is, the front end of the rear extremity) a convex shape, that is, a shape which permits progressive deformation of the metal sheet in depth, and over a greater blank holder length in comparison to the right angle of blank holders of the prior art.

21. (Amended) The tool as specified in claim 19, wherein the blank holder (AV) 30 is also widened (toward the front).

22. (Amended) The tool as specified in claim 19, wherein geometric adaptation of the blank holder AR reproduces in its part B one-half A of the shape created by the punching die in its part AV.

23. (Amended) The tool as specified in claim 19 adapted for manufacture of multiple-seat benches requiring a plurality of consecutive seat forms or imprints 11, 12, in particular two to six or eight seats or more, separated by an interval i , wherein blank holder AR 100 reproduces at least one part, preferably one-half the seat form produced by the punching die 120 in its AV part, or reproduces more than one-half, up to the entirety, of the form created by the punching die.

24. (Amended) The tool as specified in claim 19 adapted for manufacture of multiple-seat benches, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval i, in particular two or six or eight seats or more, wherein there is between the blank holder AR and the punching die 120 an area 150 the geometry of which is adapted for reproduction of the desired shape of the interval i defined as mandatorily present between two consecutive seat forms, i optionally equaling zero.

25. (Amended) The tool as specified in claim 19 adapted for manufacture of multiple-seat benches, in particular two to six or eight or more consecutive seat forms or imprints 11, 12 separated by an interval i, wherein the blank holder AV 110 has been widened toward the front.

26. (Amended) The tool as specified in claim 19 adapted for manufacture of multiple-seat benches, in particular two to six or eight or more consecutive seat forms or imprints 11, 12 separated by an interval i, wherein the tool comprises between the blank holder AV 100 and punching die 120 a shoulder 150 which reproduces the interval i which must be present between two consecutive seat imprints.

27. (Amended) The tool as specified in claim 19, wherein, in order that the stamping pitch may be modified as desired, the tool is designed in two separate parts by a transverse cut (that is, one perpendicular to the direction of advance of the metal sheet) at the level of the center of the punching die (4, 120), this forming the base tool at minimum pitch, which parts may be separated from each other by desired pitch modification value E, and wherein the tool comprises one or more sets of four dismountable pieces called bottom die 460, punching die 480, and blank holder 490 and 420 shims adapted for insertion into space E in an appropriate set.

29. (Amended) The tool as specified in claim 26, wherein such shims of bottom die 460, punching die, and blank holder 49 and 20 may be fastened by any mechanical means such bolting, etc.

30. (Amended) Stamping presses equipped with a tool as specified in claim 19.

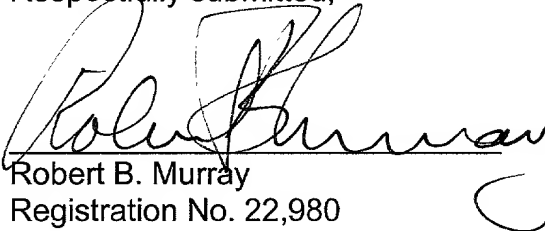
31. (Amended) Stamped articles and products, in particular ones such as include successive repetitive imprints, in particular whenever the imprints are close together, or even adjacent ($i = 0$), and in particular benches with a plurality of seats, in particular six or more, in particular two to six or eight seats or more, characterized in that such stamped articles and products have been manufactured by a process as specified in claim 1.

REMARKS

Claims 1-33 are pending in this application. By this Amendment, claims 3-5, 7-16, 18, 19, 21-27 and 29-31 are amended to delete multiple dependency. No new matter is contained in the amendments.

Please charge any fee deficiency or credit any overpayment to Deposit Account No. 01-2300.

Respectfully submitted,



Robert B. Murray
Registration No. 22,980

Customer No. 004372
ARENT FOX KINTNER PLOTKIN & KAHN, PLLC
1050 Connecticut Avenue, N.W.,
Suite 400
Washington, D.C. 20036-5339
Tel: (202) 857-6000
Fax: (202) 638-4810
RBM/aam

MARKED UP CLAIMS

20

CLAIMS

1. A stamping process in which a metal sheet T is stamped between a bottom die 10 and a punching die 4 clamped by front (AV) and rear (AR) blank holders, *characterized in that* the blank holder AR 20 is widened toward the rear relative to the dimensions of the prior art and, at the end adjacent to the punching die 4 (that is, the front (AV) end of the rear (AR) blank holder), has a convex form, that is, a form which permits progressive deformation of the metal sheet in depth and over a greater blank holder length, in place of the right angle of blank holders of the prior art.
2. A stamping process in which a metal sheet T is stamped between a bottom die 10 and a punching die 4 clamped by front (AV) and rear (AR) blank holders, *wherein* the rear blank holder (AR) 20 is widened toward the rear and is geometrically adapted to the level of the area 14 adjacent to the punching die 4 in order to reproduce at least one part of the form created by the punching die 4 in its AV part, or to reproduce precisely one-half, or more than one-half, up to the entirety of the form created by the punching die 4.
3. The stamping process as specified in claim 1 *[or 2]* wherein the front blank holder (AV) 30 is also widened (toward the front).

²¹ *claim 1*

4. The stamping process as specified in *any of claims 1 to 3* wherein the geometric adaptation of the blank holder AR represents one-half the form created by the punching die 4 in its AV part.

claim 1

5. The stamping process as specified in *any of claims 1 to 4* adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight seats or more, requiring several consecutive seat forms or imprints 11, 12 separated by interval i, wherein use is made of a tool the AR blank holder 100 of which reproduces (in its part B) at least one part, preferably precisely one-half (A) of the seat form 11, 12 created by the punching die 120 in its AV part, or creates more than one-half, up to the totality, of the form created by the punching die.

6. The stamping process as specified in claim 5 adapted for manufacture of multiple-seat benches, in particular with six to eight or more seats, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval i, wherein the blank holder AR 100 and the punching die 120 are in an area the geometry of which is adapted for reproduction of the desired form of the interval i defined as mandatorily present between two consecutive seat forms.

7. The stamping process as specified in claim 5 *or 6* adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight or more seats, requiring a plurality

of consecutive seat forms or imprints 11, 12 separated by an interval *i*, *wherein* the blank holder has been widened toward the front.

8. The stamping process as specified in ^{claim 5} [any of claims 5 to 7] adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight or more seats, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval *i*, *wherein* the profile 8 of the blank holder AV 110 remains horizontal.

9. The stamping process as specified in ^{claim 5} [any of claims 5 to 7] *wherein* the blank holder 110 may have a slightly convex surface or profile favoring transition in deformation from the metal sheet to the punching die.

10. The stamping process as specified in ^{claim 1} [any of claims 1 to 9] *wherein* the metal sheet T is positioned so as to produce a first stamping form or "initial stamping," then the metal sheet which has undergone this initial stamping is then displaced toward the rear and the initial stamping is brought to rest in area 130 AV of the blank holder AV of the blank holder AR 100, after which the second stamping is carried out and so forth until 2, 3, 4, 5, 6, 7, or 8 imprints or more have been produced.

11. The stamping process as specified in ^{claim 1} [any of claims 1 to 10] *wherein* the blank holder AR 100 reproduces in its part B one-half of the seat imprint, which is identical to half-form

A of part AV of the punching die 120, the arrow indicating the direction of step-by-step movement of the metal sheet to permit production of consecutive imprints.

12. The stamping process as specified in ^{claim 1} any of claims 1 to 11, wherein the tool comprises, between the blank holder AR 100 and the punching die 120, a shoulder 150 which reproduces the interval *i* which must be present between two consecutive seat imprints.

13. The stamping process as specified in ^{claim 1} any of claims 1 to 12, wherein a pressure of the order of 150 to 300 or 350 to is applied for a metal sheet of 15/10 mm or of 12/10 mm or of 10/10, 8/10, or 6/10 mm.

14. The stamping process as specified in ^{claim 1} any of claims 1 to 13, wherein this shoulder 150 forming interval *i* is reduced to values of the order of 1 to 3 or 5 cm for 15/10 mm metal sheets, or even one measuring 10/10 or 8/10 or 6/10 mm, or even preferably to a value *i* = 0, without marking and without folds or curls.

15. The stamping process as specified in ^{claim 1} any of claims 1 to 14, wherein at least one part of base part B of blank holder AR 100 is replaced with other support means, such as friction rollers, etc.

claim 1

16. The stamping process as specified in any of claims 1 to 15, wherein the stamping process comprises a metal sheet preforming step, preferably preforming by means of a folding machine.

17. The stamping process as specified in claim 16, wherein the metal sheet is preformed along line a, b, c, rounded part d, e, f, all sections being straight except curved section d, or the preform is made up of sections a, h (straight), d, e, f, or the preform is made up of sections a, h (straight), d, g (straight).

claim 1

18. The stamping process as specified in any of claims 1 to 17 wherein the metal sheet T is positioned without concern for vertical alignment with the punching die 4 and the punching die 10, it being possible for the metal sheet to be offset, for example, by distance m relative to the vertical alignment, and wherein the press is then lowered slowly and the metal sheet is allowed to center itself on the tool.

claim 1

19. A tool for application of the stamping process as specified in any of claims 1 to 18, characterized in that such tool comprises a bottom die 10 and a punching die 4 clamped by front (AV) and rear (AR) blank holders, and in that the blank holder AR 20 is widened toward the rear in comparison to the dimensions of the prior art and has on the end adjacent to the punching die 4 (that is, the front end of the rear extremity) a convex shape, that is, a shape which permits progressive deformation of the metal sheet in depth, and

over a greater blank holder length in comparison to the right angle of blank holders of the prior art.

20. The tool as specified in claim 19, *wherein* the rear blank holder (AR) 20 is widened toward the rear and is geometrically adapted at the level of area 14 adjacent to the punching die for reproduction of at least one part of the form created by punching die 4 in its AV part, or one-half or more than one-half, and up to the entirety of the form created by the punching die.

21. The tool as specified in claim 19 ~~or 20~~ *wherein* the blank holder (AV) 30 is also widened (toward the front).

22. The tool as specified in ^{claim 19} ~~any of claims 19 to 21~~ *wherein* geometric adaptation of the blank holder AR reproduces in its part B one-half A of the shape created by the punching die in its part AV.

23. The tool as specified in ^{claim 19} ~~any of claims 19 to 22~~ adapted for manufacture of multiple-seat benches requiring a plurality of consecutive seat forms or imprints 11, 12, in particular two to six or eight seats or more, separated by an interval *i*, *wherein* blank holder AR 100 reproduces at least one part, preferably one-half the seat form produced by the punching die 120 in its AV part, or reproduces more than one-half, up to the entirety, of the form created by the punching die.

24. The tool as specified in ^{claim 19} [any of claims 19 to 23] adapted for manufacture of multiple-seat benches, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval *i*, in particular two to six or eight seats or more, *wherein* there is between the blank holder AR and the punching die 120 an area 150 the geometry of which is adapted for reproduction of the desired shape of the interval *i* defined as mandatorily present between two consecutive seat forms, *i* optionally equaling zero.

25. The tool as specified in ^{claim 19} [any of claims 19 to 24] adapted for manufacture of multiple-seat benches, in particular two to six or eight or more consecutive seat forms or imprints 11, 12 separated by an interval *i*, *wherein* the blank holder AV 110 has been widened toward the front.

26. The tool as specified in ^{claim 19} [any of claims 19 to 25] adapted for manufacture of multiple-seat benches, in particular two to six or eight or more consecutive seat forms or imprints 11, 12 separated by an interval *i*, *wherein* the tool comprises between the blank holder AV 100 and the punching die 120 a shoulder 150 which reproduces the interval *i* which must be present between two consecutive seat imprints.

27. The tool as specified in ^{claim 19} [any of claims 19 to 26] *wherein*, in order that the stamping pitch may be modified as desired, the tool is designed in two separate parts by a transverse cut (that is, one perpendicular to the direction of advance of the metal sheet) at the level of the center of the punching die (4, 120), this forming the base tool at minimum pitch,

which parts may be separated from each other by the desired pitch modification value E, and *wherein* the tool comprises one or more sets of four dismountable pieces called bottom die 460, punching die 480, and blank holder 490 and 420 shims adapted for insertion into space E in an appropriate set.

28. The tool as specified in claim 27, *wherein* such tool is adapted for manufacture of multiple-seat benches, in particular for two to six or eight seats or more, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval *i*.

29. The tool as specified in claim 26, [or 27] *wherein* such shims of bottom die 460, punching die 48, and blank holder 49 and 20 may be fastened by any mechanical means such as bolting, etc.

30. Stamping presses equipped with a tool as specified in ^{claim 19} [any of claims 19 to 29].

31. Stamped articles and products, in particular ones such as include successive repetitive imprints, in particular whenever the imprints are close together, or even adjacent ($i = 0$), and in particular benches with a plurality of seats, in particular six or more, in particular two to six or eight seats or more, *characterized in that* such stamped articles and products have been manufactured by a process as specified in ^{claim 1} [any of claims 1 to 18 or with a tool as specified in any of claims 19 to 29 or by means of a press as specified in claim 30].

32. Stamped articles as specified in claim 31, *wherein* such articles are made with metal sheets of various customary thicknesses, in particular 15/10, 12/10, or 10/10 mm, of various common or stainless steels, optionally provided with a temporary, provisional, or definitive coating, or under a finishing layer, or again made of plates of plastics or composites of any type.

33. Sets of bottom die 460, punching die 480, and blank holder 490 and 420 shims as specified in Claim 27.

**PATENT
APPLICATION**

Title: **Stamping process and tools, applications especially to stamping of benches, and stamped articles, especially seating benches obtained by such process and tools.**

Inventor: **Philippe Furodet**

Applicant(s): **SERINOX S.A.**

ABSTRACT

A stamping process such as that applied for stamping a metal sheet T between a bottom die 10 and a punching die 4 clamped between a front blank holder (AV) and rear blank holder (AR), characterized in that the AR blank holder 20 widens toward the rear relative to the dimensions of the prior art and has on the end adjacent to the punching die 4 (that is, the front end AV of the rear AR blank holder) a convex shape, that is, a shape which permits progressive deformation of the sheet in depth, and deformation over a greater blank holder length, in place of the right angle of prior-art blank holders.

The possibility is provided of varying the spacing E by means of a set of shims.

There are numerous applications, including vehicle seating benches with 2, 6, 8, or more seats.

Figure 8

09/926373

Stamping process and tools, applications
especially to stamping of benches, and stamped articles,
in particular seating benches obtained by such process and tools.

This invention relates to the technical sector of sheet metal stamping and to the products thereby obtained.

Stamping is generally known to be an operation which consists of converting a metal sheet by means of a press to an article or product exhibiting a certain specific shape or geometry.

The principle of operation of such a press is illustrated in Figure 9.

As shown diagrammatically in the attached Figure 1, a metal sheet to be stamped T is positioned above a punching die 4 held in position above a blank holder made up of two parts of symmetrical blank holders 3 (hereinafter referred to as "two blank holders" for the sake of clarity), front AV and rear AR (AV and AR designating, as illustrated in the attached drawing, the direction of advance of the metal sheet - the metal sheet moving from the "AV" part, which marks the entry of the sheet into the press in the direction the "AR" part, which marks the point of exit of the metal sheet from the press, and each press or tool

element will be thus identified, by its parts AV and AR, in accordance with the same convention, in what follows -

in the case of consecutive multiple stampings of a single metal sheet, for example, in order to produce repetitive series of stamped forms the total length of which is much greater than the width of the press, it not being possible of course to increase such width at will, for obvious considerations of cost), such punching die exhibiting as negative the geometric shape 5 intended to form a positive imprint on the metal sheet, when the press bed 1 and the bottom dies 2 and tool 10 having positive shape or geometry 5 are lowered and apply the metal sheet to the bottom die and then deform the sheet so as to assume geometry or shape 5 as the press continues to move downward.

The expert knows that when the press moves downward and comes into contact with the metal sheet T, the press begins by clamping the metal sheet, without deforming it, between the lower surfaces 7 of the bottom dies and the upper surfaces 8 of the blank holders.

Subsequently, as the press continues to move downward, it will be seen that the metal sheet is fastened in particular at the level of the gripping brought about by facing areas 9 and 9' of the bottom dies and blank holders. Downward movement of the metal sheet accordingly will cause slight sliding of the sheet before it is fully gripped between faces 7 (9) and 8 (9') and the plate will be blocked from translatory motion and will not be able to undergo deformation over the interval defined by the space between the blank holders.

The expert knows that thinning of the metal sheet then occurs, because the sheet is lengthened to assume the shape 5, as does also deformation, especially at the level of edges 9, 9'.

When the geometric shape 5 is sufficiently marked relative to the initial plane of the sheet there inevitably occur in area 9, 9' of the metal sheet, on the one hand tightening marks due to the imprint of edges 9 and 9', one of these marks remaining visible on the side which is to be the visible side of the finished product, and on the other defects due to elongation and simultaneous deformation, ones such as curls or slight folds.

Such marks are hardly acceptable in a finished product, especially in a finished product which is not scheduled to undergo an additional stage of deposition of a protective or decorative coating or the like.

In a great number of technical sectors the advantage of stamping consists of working with a metal sheet which will yield a finished product directly, with no additional treatment which would represent an additional stage and thus additional cost.

It should be noted, however, that stainless steel is known to be even more difficult to stamp than ordinary steel. It accordingly requires stronger clamping, but with an even greater risk of marking. Nevertheless, stainless steel still naturally represents a material of choice

for a great number of items of equipment, including vehicle seating benches or waiting room benches in general.

Hence the problem solved by the invention is that of eliminating the clamping marks and the deformation curls or folds arising during stamping of metal sheets in accordance with a "marked" punching die geometry relative to the initial plane of the metal sheet.

The term "marked" is used here to designate a geometry which imposes areas of deformation which are large and/or near each other. Such is the case with the great majority of stamping operations.

One particular case, but absolutely not a restrictive one, in which this problem is particularly acute relates to stamping of a metal sheet to form benches for seating travelers, for trains, waiting rooms, airports, subways, and the like.

Such benches are illustrated diagrammatically in the attached Figure 2. It is to be seen that the metal sheet T has been stamped so as to produce seating form openings or imprints 11, 12, etc., separated by an interval i . In the prior art the ability existed of manufacturing benches of this type by stamping, but ones without hollow forms, something which naturally caused wholly unacceptable sliding of passengers forward or sideways. The stage had also been reached of manufacturing the hollow molds by stamping, but with too great an

interval between the imprints, a process also accompanied by formation of folds, marks, and curls if an attempt was made to reduce this interval, as will be explained below.

The advantage of technology of this kind is to apply stamping to form stamped articles of all types, such, to give a non-restrictive example, as benches with, especially, 2, 3, 4, 5, 6, 7, or even eight or more, seats. Such seats require precisely consecutive stampings as explained above.

Such benches manufactured by stamping are clearly less costly than molded plastic benches. As can be seen below, the invention also makes possible the stamping of plates of plastic or composite materials.

The hollow forms are, of course, progressive and the set of bench forms should be suitably convex for the sake of seating comfort, as shown in the attached Figure 3. These forms are, of course, obtained by means of the precise geometry 5 of the punching die 4 of the corresponding tool 10. The interval i is defined more precisely in Figure 3, in which i represents the length of the plane section 117 separating the two hollow (or rounded) sections 115 and 116.

If the interval i is too small, the clamping and deformation marks described above are produced during the conventional stamping processes. But precisely a small interval i is required in order to seat a maximum number of passengers over a minimum length.

Among other things the length is determined by the maximum moving dimensions of trains or coaches. The interval i often required is such that with conventional tools it results in the marks referred to above.

In addition the metal sheets T used are sheets which preferably have already been covered with a facing before stamping, which is preferably definitive, and it will no longer be possible to make these marks disappear later in this advantageous case.

The object of the invention is to eliminate these disadvantages.

Further features and advantages of the invention will appear more clearly upon reading of the following description and by reference to the accompanying drawing wherein:

- Figure 1 represents a stamping press and tools of the prior art in diagrammatic form;

- Figure 2 illustrates, in diagrammatic form, the general form of a bench of stamped metal sheet representing a particular, non-restrictive, example of application of the invention;

- Figure 3 represents, in section, the contour of the benches in diagrammatic form before they have been produced;

- Figure 4 illustrates the general principle of the invention, in the form of a lateral section through a set made up of a punching die and AV and AR blank holders;

- Figure 5 illustrates adaptation of the general principle of the invention as presented in figure 4 to manufacture by stamping of benches having comfortable recessed seats spaced at small intervals i , in the form of a transverse left-to-right (G-D) section of the press and stamping tools;

- Figure 6 illustrates, in a perspective view, the outline of a set of blank holders AV and AR and punching die suitable for manufacture of multiple-seat benches, in particular ones with 6 seats;

- Figure 8, consisting of Figures 8a (bottom die) and 8b (punching die) illustrates, in a perspective view a non-restrictive example of application of the invention to a set of blank holders AV and AR and punching die suitable for manufacture of multiple-seat benches, ones with 6 seats in particular, in one advantageous embodiment of the invention a set of bottom dies, AR blank holder, and punching die permitting modification of the "pitch" of the stamping operation.

- Figure 9 illustrates in cross-section a skeleton diagram of a prior-art stamping press which may be used as claimed for the invention, provided that appropriate tools are employed. In this conventional press 600 designates the sliding mechanism, 900 the bottom die, 700 the punching die, 950 the blank holder, 800 the bed (stationary), and 980 the bar stands, F1 and F2 indicating the conventional relative movements.

The examples illustrated in Figures 1 to 9 are of course to be understood as being non-restrictive.

As can be seen in Figure 4, the invention relates very generally to a stamping process in which the rear blank holder (AR) 20 is widened toward the rear and is geometrically adapted to the level of the area 14, that is, preferably the area adjacent to the punching die, in order to reproduce at least one part of the form created by the punching die 4 in its AV part.

The AR blank holder may also by preference reproduce exactly one-half of the AV form of the punching die, or even more than one half, up to all of the form created by the punching die, but the set would be needlessly expensive and less easy to handle in the process conducted in consecutive steps to be described below.

Similarly, the AV blank holder 30 may have a slightly convex surface or contour 8 facilitating the deformation transition from the metal sheet toward the punching die. This may be an advantage in certain applications.

In the most general embodiment of the invention, the rear blank holder AR 20 is widened toward the rear relative to the dimensions of the prior art and on the end adjacent to the punching die (that is, the front end of the rear blank holder) is convex, that is, has a shape which permits progressive deformation of the metal sheet in depth, over a greater blank holder length, in place of the right angle of prior-art blank holders.

By way of preeminent preference, but not obligatorily, the front blank holder (AV) 30 is equally widened (toward the front) but its geometry requires no adaptation, that is, its surface 8 remains level but is widened toward the front relative to the customary dimensions of the prior art.

While wishing not to be restricted by any theory, the Applicant does believe that adaptation of the AR blank holder to at least one part of the geometry of the form created by the blank holder in its AV part makes it possible to render the clamping more progressive while better distributing the stresses applied by the press to the metal sheet, in terms both of surface and of time. The metal sheet would accordingly then be better able to adapt to the stresses and would be deformed without developing either clamping marks or curls or folds, even in the case of forms of "marked" geometry as defined above.

Widening of the AV blank holder 30 allays the same concern over better distribution of clamping stresses and then deformation. This widening of the AV blank holder 30 is less critical than adaptation of the AR blank holder 20, but does represent a favorable characteristic in a preferred embodiment of the invention.

One important advantage of the invention, aside from elimination of clamping marks and folds or curls, one which was brought to light at a time when it was not part of the technical problem initially formulated, is that it is possible to bring about very great reduction in pressure before it is applied by the press.

For a given stamped product, such as a six-seat bench as described below, the prior art makes use of a force of around 500 tons, while the invention is content with employing 150 to 300 or 350 tons for the same metal sheet.

The expert will appreciate the great industrial benefit of this advantage, particularly in terms of investment.

In an especially preferred embodiment of the invention, geometric adaptation of the AR blank holder represents half the form created by the punching die in its AV part.

Figures 6 and 7 illustrate non-restrictive examples of the invention, ones suitable for manufacture by stamping of multiple-seat benches, such as benches with two to six or more seats.

The perspective view in Figure 6 shows that the AR blank holder 100 in this particular non-restrictive embodiment reproduces one-half the seat form created by the punching die 120 in its AV part. However, in a less preferred alternative embodiment, the blank holder 100 could reproduce only a part, less than half, of the seat form of the punching die.

Within the framework of the general process claimed for the invention, the AR [rear] blank holder could also reproduce more than one-half, up to the entirety, of the form created by the punching die, but the whole would be needlessly costly and not as easy to manage in the process made up of consecutive steps which is described below.

Between the AR blank holder and the punching die 120 there is an area whose geometry has been adapted for reproduction of the desired form of interval i as defined as necessarily present between two consecutive seat forms.

The AV [front] blank holder 110 has been widened toward the front as indicated above as a non-mandatory option, but as can be seen from this example its profile 8 remains horizontal.

Figure 7 illustrates the process claimed for the invention.

It can be seen that the metal plate is positioned so as to obtain a first stamping form or "starting form." The metal sheet which has undergone this initial stamping is then displaced toward the "rear" and the "starting form" is repositioned on area 130 of the blank holder AR 100; a second stamping is then carried out, and so forth until, for example, six stampings have been produced.

Figure 7 shows that the blank holder AR 100 reproduces in its part B one-half of the seat stamping, identical to the half-form A of the punching die 120 in its AV part, the arrow indicating the direction of movement of the metal sheet step by step.

It is also to be seen that the tool has between blank holder 100 and punching die 120 a shoulder 150 which reproduces the interval i which must be present between consecutive seat stampings.

The expert will see that it is at this level that all the advantages of the invention are obtained. In particular, the half-stamping contour of the blank holder AR 100 allows reduction of the constraints to which the metal sheet is subjected (consequently, in addition to the stamping pressure); the set as a whole permits reduction of interval i to small values, of the order of 1 to 3 or 5 cm for metal sheets measuring 15/10 mm or even 12/10 mm or even 10/10, 8/10, or 6/10 mm, something which was impossible in the prior art without

marking and without folds or curls. In the prior art, that is, with a tool as shown in Figure 1, the smallest interval i that could be achieved was 3 to 10 cm for a 15/10 metal sheet and 5 to 12 cm for a 12/10 mm metal sheet, and this without the ability to eliminate the disadvantages referred to.

The invention accordingly allows use of a thinner metal sheet for a given assigned interval i ; this represents a significant saving of material.

As we have seen, the invention also permits reduction of the interval with a metal sheet of equal thickness.

Another advantage claimed for the invention is production of smooth convex forms at the level of the interval, while in the prior art a level area is always found at this location.

It is claimed for the invention that it is even possible to reduce the interval i to zero without occurrence of folds or marks or curls. Forms are then obtained whose recesses 115, 116 are exactly adjacent and so form a rounded area with no level part 117 between each form, for example between each seating form 11, 12 if a bench is involved.

The invention accordingly enables the expert to employ these two parameters, interval and thickness, to effect the best possible accommodation to an order placed by his customer.

It is important for the metal sheet to rest after initial stamping on part B of the blank holder 100 in every stamping process (in this instance part B represents a half-form); if the metal sheet does not rest on this base, it is bent during successive advances and stampings.

The expert will understand that at least one part of the base part B might be replaced with other bearing means, such as friction rollers, etc, but the whole benefit of the invention is obtained when the blank holder AR 100 reproduces at least one part (in figure 7, one-half) of the impression made by the punching die 120.

In a preeminently preferred embodiment, the stamping process includes a metal sheet preforming step, as illustrated in figure 5.

The tool, punching die 4 and bottom die 10, and also the metal sheet, are shown here in cross-section.

In the best embodiment of the invention, and in the non-restrictive embodiment which is given as an example, the metal sheet is preformed by means of a bending machine.

However, the machine permits use of a preform which is simplified in comparison to the one which was mandatory in the prior art.

In a first preform embodiment the metal sheet is preformed along line a, b, c, rounded part d, e, f. All the sections are rectilinear, except for the curved part d.

In the prior art it was mandatory to preform the metal sheet by following the curvature of the seat, something which represented 84 operations on the folding machine in the example.

It is claimed for the invention that it is possible to use a preform comprising essentially straight sections a, b, c, e, and f, and a single rounded part d, the aggregate representing no more than 19 folds rather than 84.

It is to be noted that the set of folds between sections b and c alone represents 14 plies.

The invention also covers a first alternative in which the preform is formed in (rectilinear) sections a, b, c, d, g.

The invention also covers a second alternative embodiment in which the preform would be made up of sections a, h (rectilinear), d, e, f.

The invention also covers a third alternative embodiment in which the preform would be made up of sections a, h (rectilinear), d, g (rectilinear).

As can be seen, these three alternative embodiments again reduce the number of folding operations and accordingly improve the cost effectiveness of the process.

It is claimed for the invention that the metal sheet is positioned (as shown in Figure 7) without concern over aligning it vertically with the punching die and bottom die. The metal sheet may, for example, be offset some distance from vertical alignment. The press is then lowered slowly and the metal sheet is allowed to center itself on the tool.

The invention also creates the prospect, which was not part of the technical problem initially formulated, and so is surprising, of modifying the "pitch" imposed by the tool.

In the prior art, if it was desired to modify the stamping pitch, for example, in order to adapt a given type of product to orders coming from different customers who might require different dimensions, there was no other resource than dismounting the entire tool and replacing it with a new tool. Hence it was necessary to have as many tools as there were different pitches, and it was necessary also to handle entire sets of tools.

In contrast, as a result of the original concept of the blank holder AR, punching die, and bottom die claimed for the invention, as can be seen in Figure 8, the pitch may be modified at will by designing the tool in two separate parts by means of a transverse cut (that is, perpendicular to the direction of advance of the metal sheet), it forming the base tool at minimum pitch, and then by deducting from the desired pitch modification value E the two

parts of the tool thereby created by this separation, and by inserting into the gap E a suitable set of four dismountable pieces called shims, of bottom die 460, punching die 480, and blank holder 490 and 420.

These pieces may be fixed in position by any mechanical means, such as bolting, etc.

The advantage of this option lies in the fact that a single tool and one or more sets of such shims make it possible to adapt to each of the standards or customary practices of the target commercial areas rather than change the tool as a whole.

The invention also covers the tool as described, suitable for manufacture of benches with several seats, especially from two to six or eight or more requiring several consecutive seat forms or imprints 11, 12 separated by interval i , characterized in that, for it to be possible to modify the stamping pitch at will, the tool is designed in two separate parts by means of a transverse cut (that is, a cut perpendicular to the direction of advance of the metal sheet) at the level of the middle of the punching die (4, 120), which forms the base tool at the minimum pitch, it being possible for the parts to be separated from each other by the desired pitch modification value E, and in that the tool comprises one or more sets of four removable pieces called bottom die 460, punching die 480, and blank holder 490 and 420 shims suitable for insertion as an appropriate set into the interval E.

Among other things, the invention relates to stamping of all pieces similar to those of the example described, and in particular to any piece exhibiting similar repetitive imprints, but also to stamping of pieces of thin sheet metal, even non-repetitive stamping, in which marking, folding, or curling problems arise.

It is also possible to use holes directly in the "bottom" of the bench, that is, between areas 10 and 11 of the bench, for evacuation of rain water, in particular by means of a suitable imprint at the bottom of the bottom die relative to the punching die.

The invention permits stamping of metal sheets of different common thicknesses, by applying, as stated, a very low pressure, of the order of one-half the pressure generally applied, and also stamping of metal sheets of various common or stainless steels, or various common alloys, having a temporary lining, provisional or definitive, or under a finish layer, or again to effect stamping of plastic or composite plates of any type.

The press and the tool may be a heating press, depending on the material to be treated.

The invention covers the stamping process which has just been described, as well as the corresponding tools and corresponding preforms, along with the articles and products thereby obtained.

The invention also covers the stamping process which has just been described, as well as the corresponding tools and corresponding preforms, along with articles and products thereby obtained, adapted by the expert by conventional methods to stamping of products and articles of all forms compatible with the teaching of this description.

The expert will know how to adapt the invention to alternatives and options which will become directly apparent to him and to which the invention also relates.

CLAIMS

1. A stamping process in which a metal sheet T is stamped between a bottom die 10 and a punching die 4 clamped by front (AV) and rear (AR) blank holders, *characterized in that* the blank holder AR 20 is widened toward the rear relative to the dimensions of the prior art and, at the end adjacent to the punching die 4 (that is, the front (AV) end of the rear (AR) blank holder), has a convex form, that is, a form which permits progressive deformation of the metal sheet in depth and over a greater blank holder length, in place of the right angle of blank holders of the prior art.

2. A stamping process in which a metal sheet T is stamped between a bottom die 10 and a punching die 4 clamped by front (AV) and rear (AR) blank holders, *wherein* the rear blank holder (AR) 20 is widened toward the rear and is geometrically adapted to the level of the area 14 adjacent to the punching die 4 in order to reproduce at least one part of the form created by the punching die 4 in its AV part, or to reproduce precisely one-half, or more than one-half, up to the entirety of the form created by the punching die 4.

3. The stamping process as specified in claim 1 or 2, *wherein* the front blank holder (AV) 30 is also widened (toward the front).

4. The stamping process as specified in any of claims 1 to 3, *wherein* the geometric adaptation of the blank holder AR represents one-half the form created by the punching die 4 in its AV part.

5. The stamping process as specified in any of claims 1 to 4 adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight seats or more, requiring several consecutive seat forms or imprints 11, 12 separated by interval i, *wherein* use is made of a tool the AR blank holder 100 of which reproduces (in its part B) at least one part, preferably precisely one-half (A) of the seat form 11, 12 created by the punching die 120 in its AV part, or creates more than one-half, up to the totality, of the form created by the punching die.

6. The stamping process as specified in claim 5 adapted for manufacture of multiple-seat benches, in particular with six to eight or more seats, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval i, *wherein* the blank holder AR 100 and the punching die 120 are in an area the geometry of which is adapted for reproduction of the desired form of the interval i defined as mandatorily present between two consecutive seat forms.

7. The stamping process as specified in claim 5 or 6 adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight or more seats, requiring a plurality

of consecutive seat forms or imprints 11, 12 separated by an interval i , *wherein* the blank holder has been widened toward the front.

8. The stamping process as specified in any of claims 5 to 7, adapted for manufacture of multiple-seat benches, in particular ones with two to six or eight or more seats, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval i , *wherein* the profile 8 of the blank holder AV 110 remains horizontal.

9. The stamping process as specified in any of claims 5 to 7, *wherein* the blank holder 110 may have a slightly convex surface or profile favoring transition in deformation from the metal sheet to the punching die.

10. The stamping process as specified in any of claims 1 to 9, *wherein* the metal sheet T is positioned so as to produce a first stamping form or "initial stamping," then the metal sheet which has undergone this initial stamping is then displaced toward the rear and the initial stamping is brought to rest in area 130 AV of the blank holder AV of the blank holder AR 100, after which the second stamping is carried out and so forth until 2, 3, 4, 5, 6, 7, or 8 imprints or more have been produced.

11. The stamping process as specified in any of claims 1 to 10, *wherein* the blank holder AR 100 reproduces in its part B one-half of the seat imprint, which is identical to half-form

A of part AV of the punching die 120, the arrow indicating the direction of step-by-step movement of the metal sheet to permit production of consecutive imprints.

12. The stamping process as specified in any of claims 1 to 11, *wherein* the tool comprises, between the blank holder AR 100 and the punching die 120, a shoulder 150 which reproduces the interval *i* which must be present between two consecutive seat imprints.

13. The stamping process as specified in any of claims 1 to 12, *wherein* a pressure of the order of 150 to 300 or 350 to is applied for a metal sheet of 15/10 mm or of 12/10 mm or of 10/10, 8/10, or 6/10 mm.

14. The stamping process as specified in any of claims 1 to 13, *wherein* this shoulder 150 forming interval *i* is reduced to values of the order of 1 to 3 or 5 cm for 15/10 mm metal sheets, or even one measuring 10/10 or 8/10 or 6/10 mm, or even preferably to a value $i = 0$, without marking and without folds or curls.

15. The stamping process as specified in any of claims 1 to 14, *wherein* at least one part of base part B of blank holder AR 100 is replaced with other support means, such as friction rollers, etc.

16. The stamping process as specified in any of claims 1 to 15, *wherein* the stamping process comprises a metal sheet preforming step, preferably preforming by means of a folding machine.

17. The stamping process as specified in claim 16, *wherein* the metal sheet is preformed along line a, b, c, rounded part d, e, f, all sections being straight except curved section d, or the preform is made up of sections a, h (straight), d, e, f, or the preform is made up of sections a, h (straight), d, g (straight).

18. The stamping process as specified in any of claims 1 to 17, *wherein* the metal sheet T is positioned without concern for vertical alignment with the punching die 4 and the punching die 10, it being possible for the metal sheet to be offset, for example, by distance m relative to the vertical alignment, and *wherein* the press is then lowered slowly and the metal sheet is allowed to center itself on the tool.

19. A tool for application of the stamping process as specified in any of claims 1 to 18, *characterized in that* such tool comprises a bottom die 10 and a punching die 4 clamped by front (AV) and rear (AR) blank holders, and *in that* the blank holder AR 20 is widened toward the rear in comparison to the dimensions of the prior art and has on the end adjacent to the punching die 4 (that is, the front end of the rear extremity) a convex shape, that is, a shape which permits progressive deformation of the metal sheet in depth, and

over a greater blank holder length in comparison to the right angle of blank holders of the prior art.

20. The tool as specified in claim 19, *wherein* the rear blank holder (AR) 20 is widened toward the rear and is geometrically adapted at the level of area 14 adjacent to the punching die for reproduction of at least one part of the form created by punching die 4 in its AV part, or one-half or more than one-half, and up to the entirety of the form created by the punching die.

21. The tool as specified in claim 19 or 20, *wherein* the blank holder (AV) 30 is also widened (toward the front).

22. The tool as specified in any of claims 19 to 21, *wherein* geometric adaptation of the blank holder AR reproduces in its part B one-half A of the shape created by the punching die in its part AV.

23. The tool as specified in any of claims 19 to 22 adapted for manufacture of multiple-seat benches requiring a plurality of consecutive seat forms or imprints 11, 12, in particular two to six or eight seats or more, separated by an interval i, *wherein* blank holder AR 100 reproduces at least one part, preferably one-half the seat form produced by the punching die 120 in its AV part, or reproduces more than one-half, up to the entirety, of the form created by the punching die.

24. The tool as specified in any of claims 19 to 23 adapted for manufacture of multiple-seat benches, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval *i*, in particular two to six or eight seats or more, *wherein* there is between the blank holder AR and the punching die 120 an area 150 the geometry of which is adapted for reproduction of the desired shape of the interval *i* defined as mandatorily present between two consecutive seat forms, *i* optionally equaling zero.

25. The tool as specified in any of claims 19 to 24 adapted for manufacture of multiple-seat benches, in particular two to six or eight or more consecutive seat forms or imprints 11, 12 separated by an interval *i*, *wherein* the blank holder AV 110 has been widened toward the front.

26. The tool as specified in any of claims 19 to 25 adapted for manufacture of multiple-seat benches, in particular two to six or eight or more consecutive seat forms or imprints 11, 12 separated by an interval *i*, *wherein* the tool comprises between the blank holder AV 100 and the punching die 120 a shoulder 150 which reproduces the interval *i* which must be present between two consecutive seat imprints.

27. The tool as specified in any of claims 19 to 26, *wherein*, in order that the stamping pitch may be modified as desired, the tool is designed in two separate parts by a transverse cut (that is, one perpendicular to the direction of advance of the metal sheet) at the level of the center of the punching die (4, 120), this forming the base tool at minimum pitch,

which parts may be separated from each other by the desired pitch modification value E, and *wherein* the tool comprises one or more sets of four dismountable pieces called bottom die 460, punching die 480, and blank holder 490 and 420 shims adapted for insertion into space E in an appropriate set.

28. The tool as specified in claim 27, *wherein* such tool is adapted for manufacture of multiple-seat benches, in particular for two to six or eight seats or more, requiring a plurality of consecutive seat forms or imprints 11, 12 separated by an interval *i*.

29. The tool as specified in claim 26, or 27, *wherein* such shims of bottom die 460, punching die 48, and blank holder 49 and 20 may be fastened by any mechanical means such as bolting, etc.

30. Stamping presses equipped with a tool as specified in any of claims 19 to 29.

31. Stamped articles and products, in particular ones such as include successive repetitive imprints, in particular whenever the imprints are close together, or even adjacent ($i = 0$), and in particular benches with a plurality of seats, in particular six or more, in particular two to six or eight seats or more, *characterized in that* such stamped articles and products have been manufactured by a process as specified in any of claims 1 to 18 or with a tool as specified in any of claims 19 to 29 or by means of a press as specified in claim 30.

32. Stamped articles as specified in claim 31, *wherein* such articles are made with metal sheets of various customary thicknesses, in particular 15/10, 12/10, or 10/10 mm, of various common or stainless steels, optionally provided with a temporary, provisional, or definitive coating, or under a finishing layer, or again made of plates of plastics or composites of any type.

33. Sets of bottom die 460, punching die 480, and blank holder 490 and 420 shims as specified in Claim 27.

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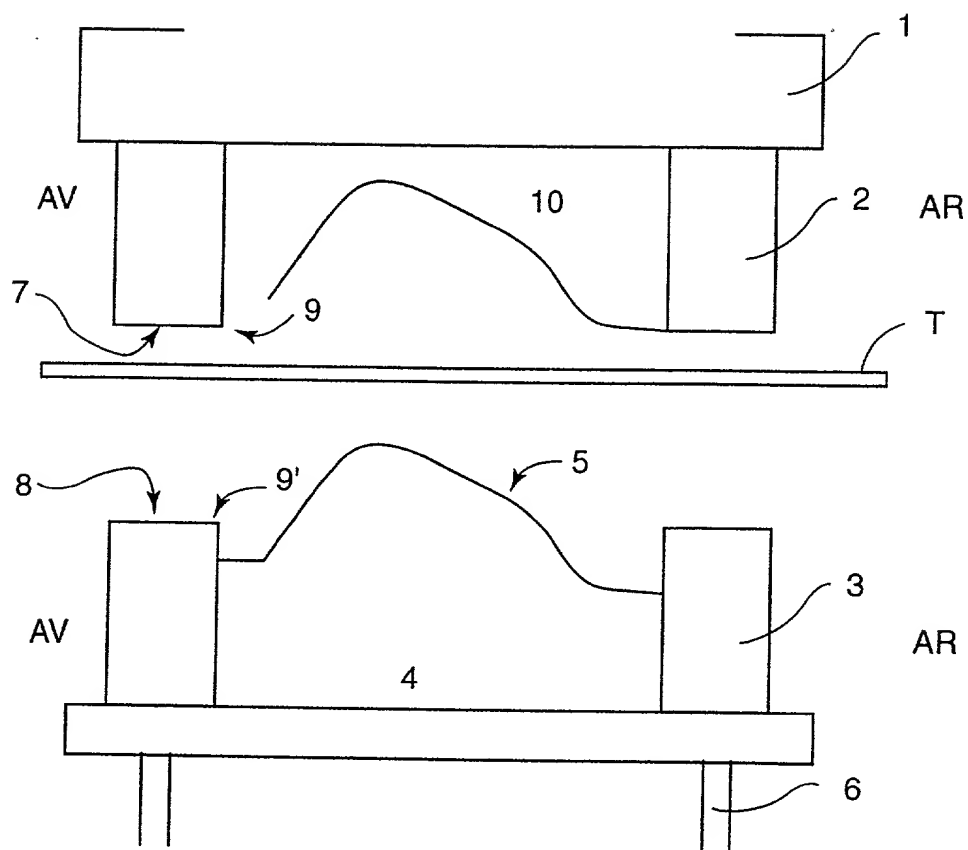


FIG. 1

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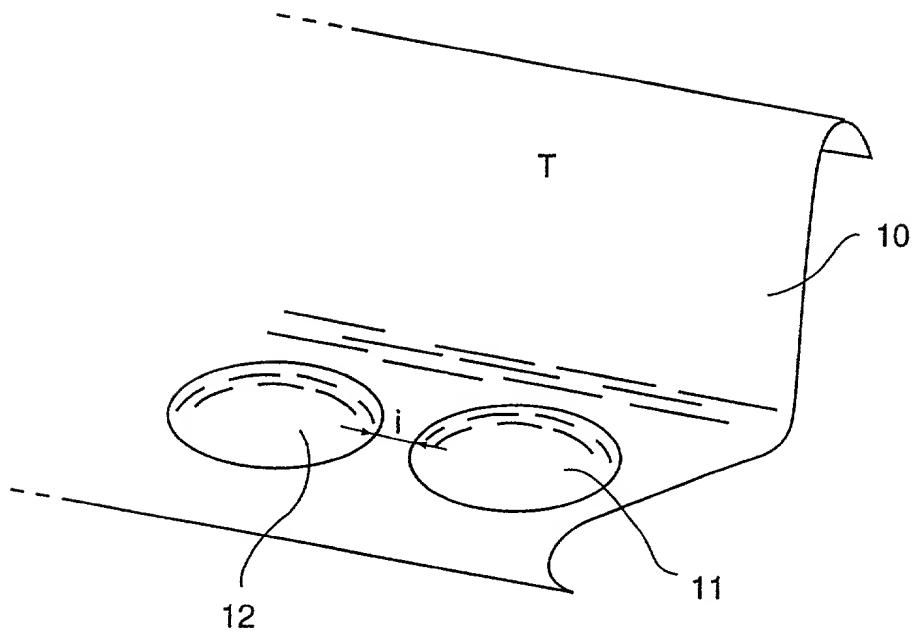


FIG. 2

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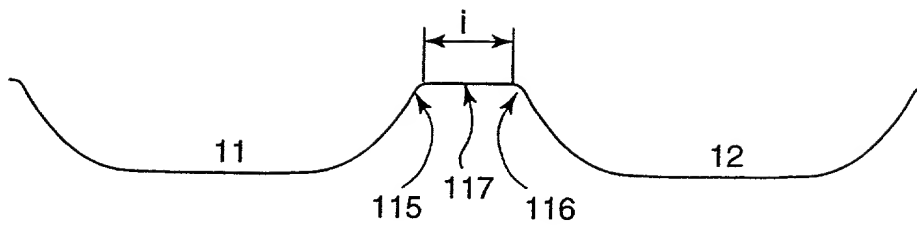


FIG. 3

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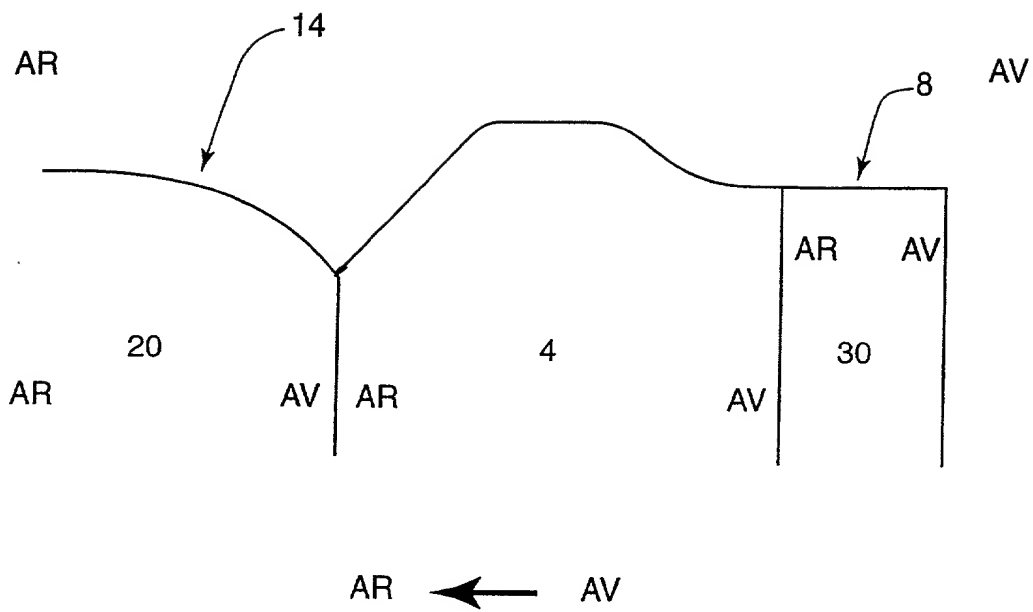


FIG. 4

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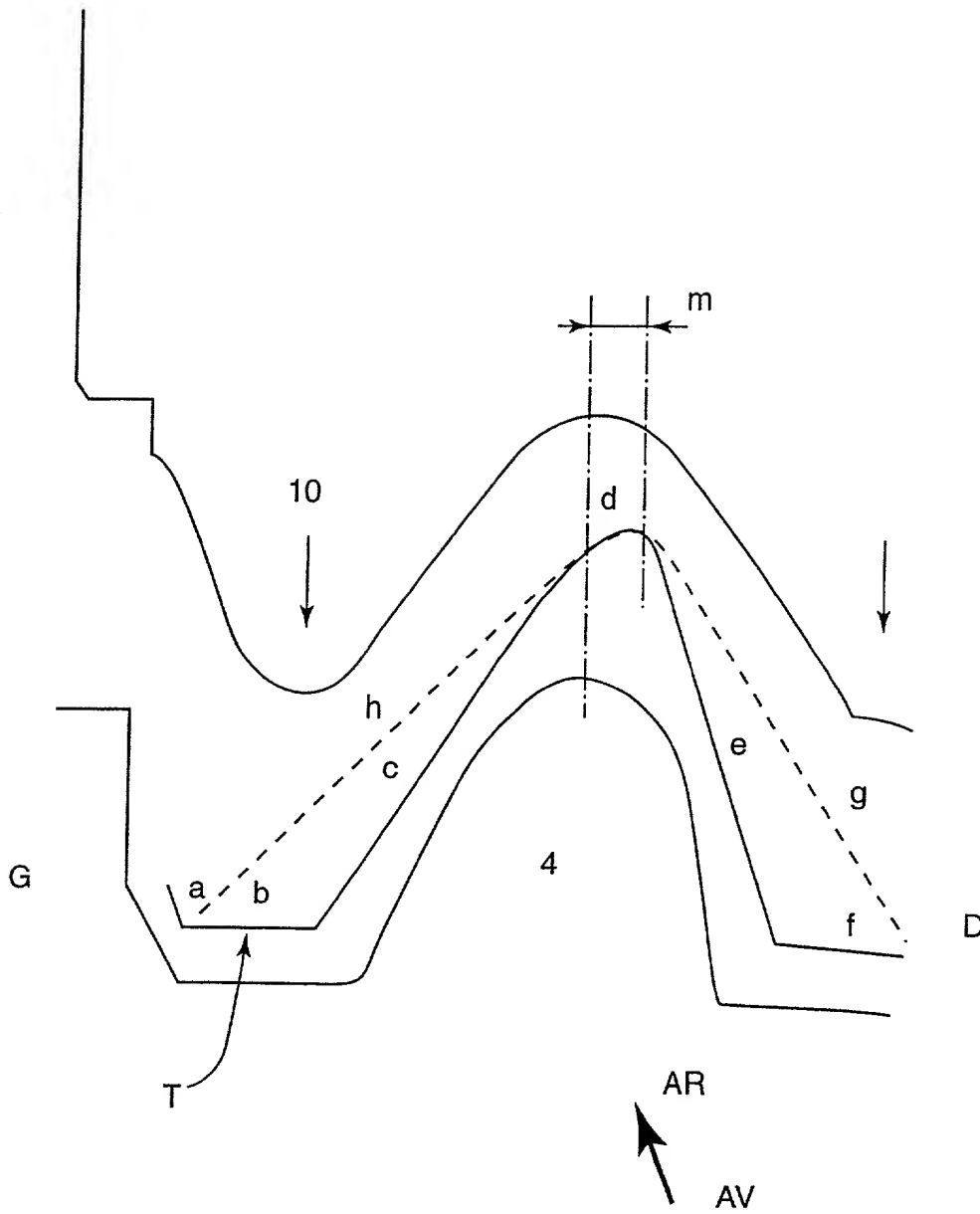


FIG. 5

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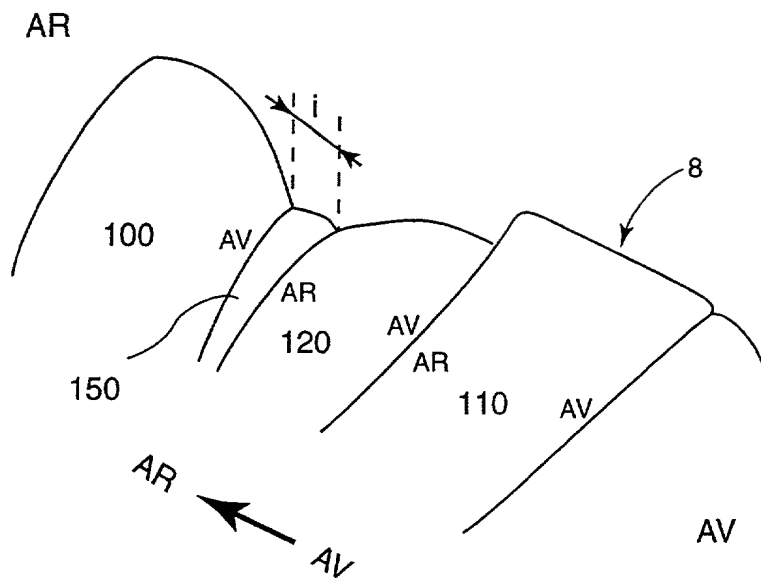


FIG. 6

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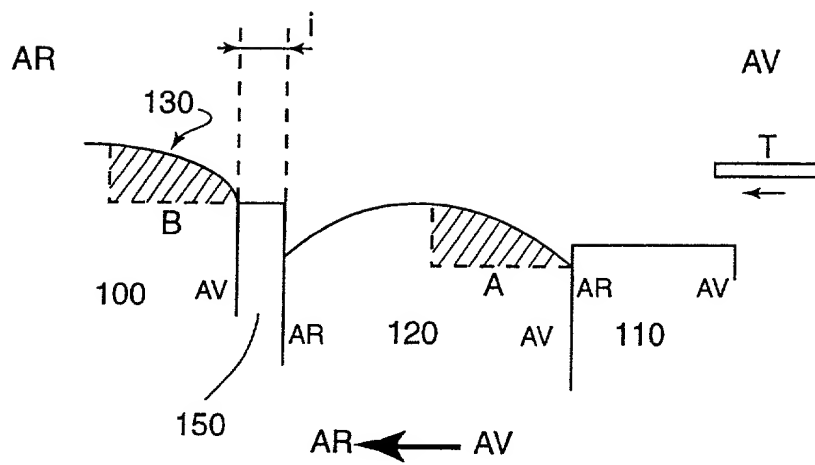


FIG. 7

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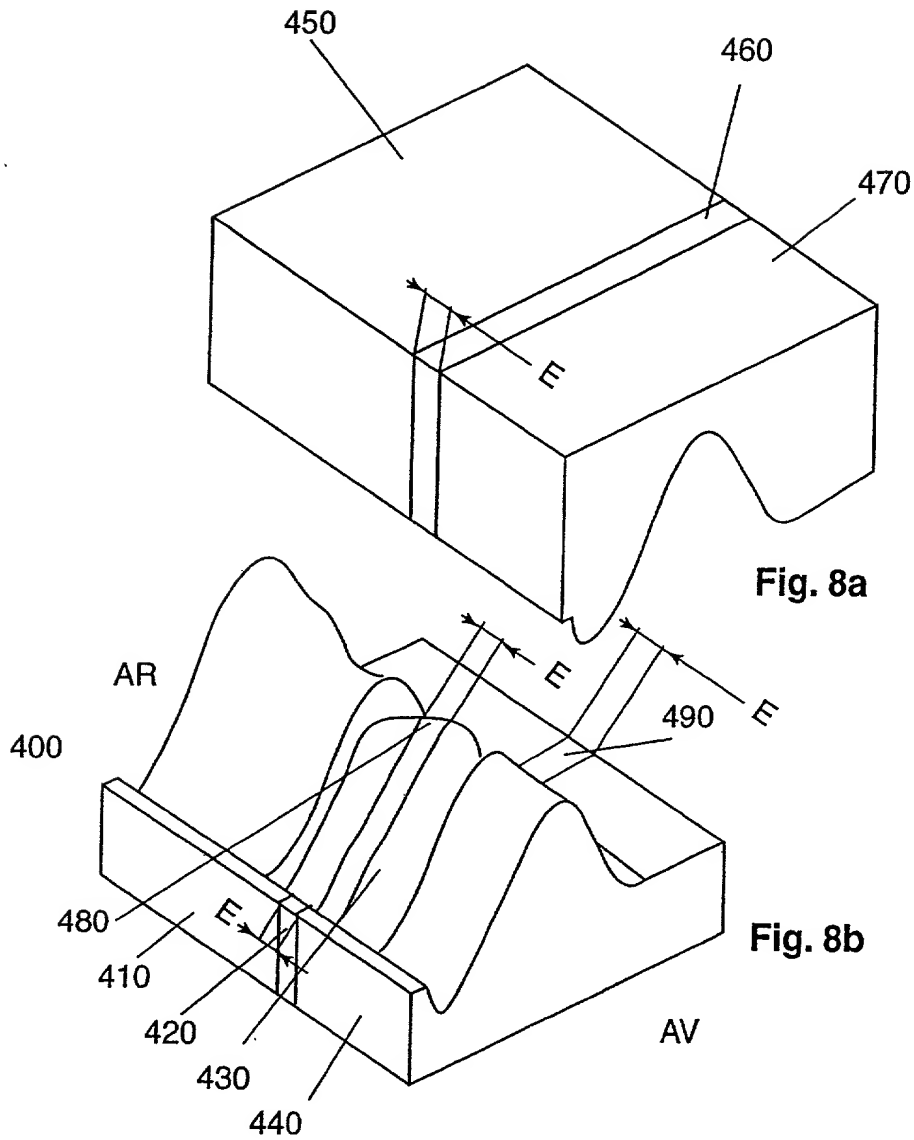


FIG. 8

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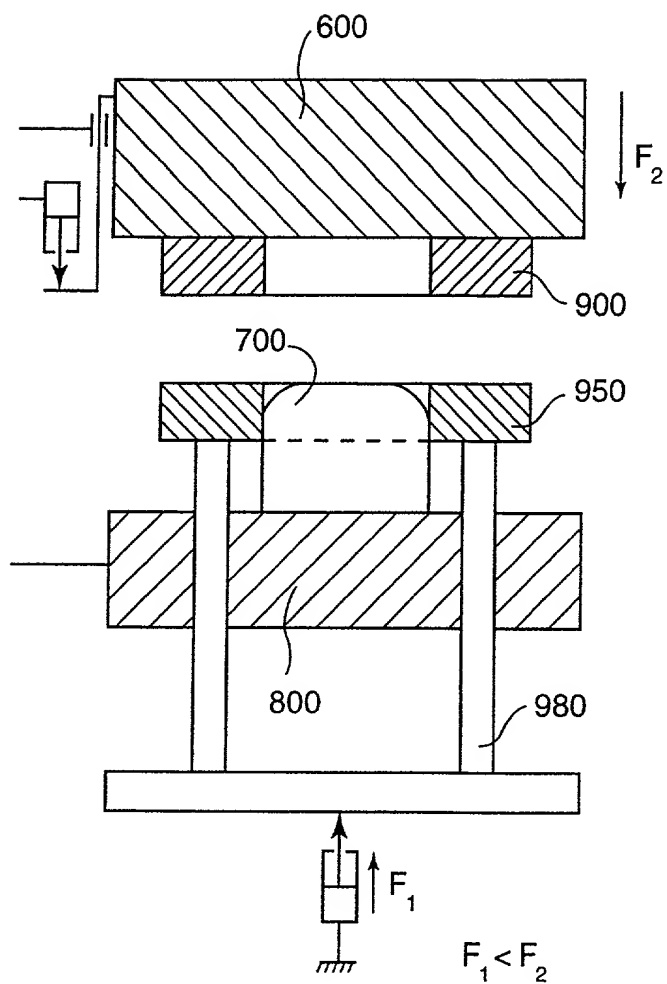


FIG. 9

Docket No. 024118-00011

ARENT FOX KINTNER PLOTKIN & KAHN, PLLC

Declaration For U.S. Patent Application

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

(Insert Title) DIE-STAMPING METHOD AND TOOLS, USE THEREOF FOR STAMPING BENCHES AND STAMPEDARTICLES SUCH AS BENCHES THUS OBTAINED

the specification of which is attached hereto unless the following box is checked:

☒ was filed on April 14, 2000 As PCT International Application
Number PCT/FR00/00995 and was amended on _____
and/or was filed on October 22, 2001 As U.S. Patent Application
Number 09/926,373 and was amended on _____

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate or PCT International Application having a filing date before that of the application(s) for which priority is claimed:

(List prior foreign applications)	<u>99/05220</u> (Number)	<u>France</u> (Country)	<u>21 April 1999</u> (Day/Month/Year Filed)	Priority Claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No
	(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

(Application Number)	(Filing Date)
(Application Number)	(Filing Date)

☐ See attached list for additional prior foreign or provisional applications.

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s) or §365(c) of any PCT International application(s) designating the United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior application(s) (U.S. or PCT) in the manner provided by the first paragraph of 35, U.S.C. §112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(List prior U.S. Applications or PCT International applications designating the U.S.)	(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
	(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

And I hereby appoint the firm of Arent Fox, Customer Number 004372 including as principal attorneys: Robert B. Murray, Reg. No. 22,980; Charles M. Marmelstein, Reg. No. 25,895; George E. Oram, Jr., Reg. No. 27,931; Douglas H. Goldhush, Reg. No. 33,125; Richard J. Berman, Reg. No. 39,107; Murat Ozgu, Reg. No. 44,275; Robert K. Carpenter, Reg. No. 34,794; Gregory B. Kang, Reg. No. 45,273; Rustan Hill, Reg. No. 37,351; Kevin Turner, Reg. No. 43,437; Rhonda L. Barton, Reg. No. 47,271; Hans J. Crosby, Reg. No. 44,634; David D. Dzara, Reg. No. 47,543; Lynne D. Anderson, Reg. No. 46,412; Laurence J. Edson, Reg. No. 44,666; Dinnaia J. Doster, Reg. No. 45,268; Michael A. Steinberg, Reg. No. 43,160 and Lynn A. Bristol, Reg. No. 48,898.Please direct all communications to the following address: Customer No. 004372
ARENT FOX KINTNER PLOTKIN & KAHN, PLLC
1050 Connecticut Avenue, N.W., Suite 400
Washington, D.C. 20036-5339
Telephone No. (202) 857-6000; Facsimile No. (202) 638-4810

The undersigned hereby authorizes the U.S. attorneys named herein to accept and follow instructions from the undersigned's assignee, if any, and/or, if the undersigned is not a resident of the United States, the undersigned's domestic attorney, patent attorney or patent agent, as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and the undersigned. In the event of a change in the person(s) from whom instructions may be taken, the U.S. attorneys named herein will be so notified by the undersigned.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1-00 Full name of sole or first inventor Philippe FURODET

Inventor's
signature

76/11/201
Date

Residence Thiers, France

Citizenship French

Post Office Address Serinox, Route de Ste Marguerite, F-63307 Thiers, France

Full name of sole or second inventor

Inventor's
signature

Date

Residence

Citizenship

Post Office Address

Full name of sole or third inventor

Inventor's
signature

Date

Residence

Citizenship

Post Office Address